Applied Academy

H-86 sector-22 Noida

MATHS SURFACE AREA AND VOLUME AND AREA RELATED TO CIRCLE

Class 10 - Mathematics

1. If the perimeter of a sector of a circle of radius 6.5 cm is 29 cm, then its area is **[1]**

   a) 56 cm^2 b) 58 cm^2

   c) 52 cm^2 d) 25 cm^2

2. Find the area of the sector if the radius is 12 cm and with an angle of 134^o. **[1]**

   a) 167.38 cm b) 158.38 cm

   c) 168.00 cm d) 168.38 cm

3. The length of an arc that subtends an angle of 24^o at the centre of a circle with 5 cm radius is **[1]**

   a) $\frac{3\pi}{2}$ cm b) $\frac{5\pi}{3}$ cm

   c) $\frac{\pi}{3}$ cm d) $\frac{2\pi}{3}$ cm

4. A horse is grazing in a field. It is tied to a pole with a rope of length 6 m. The horse moves from point A to point B making an arch with an angle of 70°. Find the area of the sector grazed by the horse. **[1]**

   a) 22.99 m b) 20.99 m

   c) 21.99 m d) 21 m

5. What is the formula to calculate the area of a sector? **[1]**

   a) $\frac{x^\circ}{360^\circ} - \pi r^2$ b) $\frac{x^\circ}{360^\circ} \times \pi r^3$

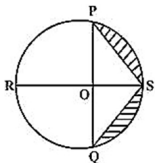
   c) $\frac{x^\circ}{360^\circ} + \pi r^2$ d) $\frac{x^\circ}{360^\circ} \times \pi r^2$

6. The area of a sector of angle α (in degrees) of a circle with radius R is: **[1]**

   a) $\frac{\alpha}{180} \times 2\pi R$ b) $\frac{\alpha}{180} \times \pi R^2$

   c) $\frac{\alpha}{360} \times 2\pi R$ d) $\frac{\alpha}{360} \times \pi R^2$

7. In the given figure PQ and RS are the perpendicular diameters of the circle whose centre is O and radius = 14 cm. the area of the shaded region is **[1]**



   a) 28 cm^2 b) 35 cm^2

   c) 60 cm^2 d) 112 cm^2

8. Find the area of a sector of angle p (in degrees) of a circle with radius R. **[1]**

9. Find the area of a sector of circle of radius 21 cm and central angle 120°. **[1]**

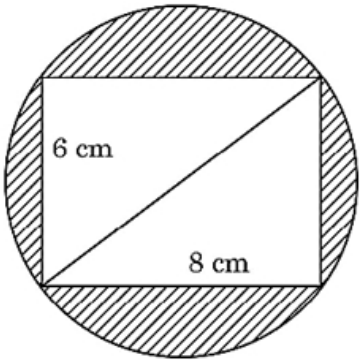
10. A chord of a circle of radius 10 cm subtends a right angle at its centre. What is the length of the chord. **[1]**

11. What is the perimeter of a sector of a circle whose central angle is 90° and radius is 7 cm? **[1]**

12. Write the formula for the area of a sector of angle θ (in degrees) of a circle of radius r. **[1]**

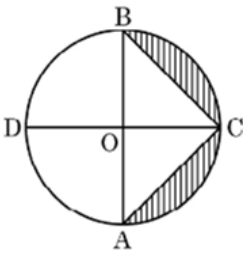
13. Find the area of the segment of a circle of radius 14 cm, if the length of the corresponding arc APB is 22 cm. **[2]**

14. Reeti prepares a Rakhi for her brother Ronit. The Rakhi consists of a rectangle of length 8 cm and breadth 6 cm inscribed in a circle as shown in the figure. Find the area of the shaded region. (Use π = 3·14) **[2]**



15. The minute hand of a clock is 15 cm long. Calculate the area swept by it in 20 minutes. [Take π = 3.14.] **[2]**

16. In the given figure, AB and CD are the diameters of a circle with centre O, perpendicular to each other. If OA = 7 cm, find the area of the shaded region. **[2]**

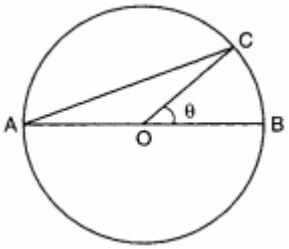


17. A sector of a circle of radius 4 cm contains an angle of 30°. Find the area of the sector. **[2]**

18. In a circle of radius 21 cm, an arc subtends an angle of 60^o at the centre. Find the area of the sector formed by the arc. Also, find the length of the arc. **[2]**

19. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector. **[2]**

20. AB is the diameter of a circle, centre O. C is a point on the circumference such that $\angle COB = \theta$. The area of the minor segment cut off by AC is equal to twice the area of the sector BOC. Prove that $\sin\frac{\theta}{2}\cos\frac{\theta}{2} = \pi\left(\frac{1}{2} - \frac{\theta}{120}\right)$. **[3]**



21. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. **[3]**
    i. Find the length of the arc,
    ii. the area of the sector,
    iii. the area of the minor segment, and
    iv. the area of the major segment. [Given, $\sqrt{3}$ = 1.72.]

22. Find the area of the minor segment of circle of radius 14 cm, when the angle of corresponding sector is 60°. **[3]**

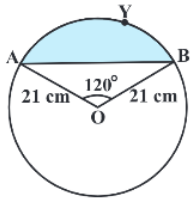
23. A chord PQ of a circle of radius 10 cm subtends an angle of 60^o at the centre of the circle. Find the area of major **[3]**

and minor segments of the circle.

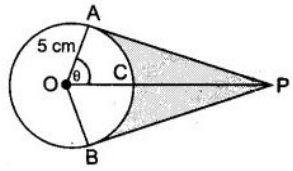
24. A chord AB of circle of radius 14 cm makes an angle of 60° at the centre. Find the area of the minor segment of the circle. (Use π = 22/7) **[3]**

25. Find the area of the sector of a circle with radius 4 cm and of angle 30°. Also, find the area of the corresponding major sector.(use $\pi = 3.14$) **[3]**

26. Find the area of the segment AYB shown in Figure, if the radius of the circle is 21 cm and ∠AOB = 120°. (Use $\pi = \frac{22}{7}$). **[3]**



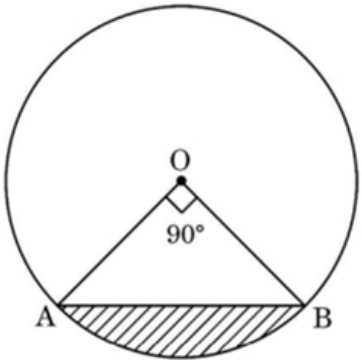
27. An elastic belt is placed round the rim of a pulley of radius 5 cm. One point on the belt is pulled directly away from the centre O of the pulley until it is at P, 10 cm from O. Find the length of the belt that is in contact with the rim of the pulley. Also, find the shaded area. **[5]**



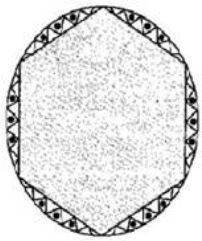
28. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of rope is increased to 10 m. (Use π = 3·14) **[5]**

29. Find the area of the segment of a circle of radius 12 cm whose corresponding sector central angle 60°. (Use π = 3.14). **[5]**

30. In the given figure, AB is a chord of a circle of radius 7 cm and centred at O. Find the area of the shaded region if ∠AOB = 90^o. Also, find length of minor arc AB. **[5]**



31. A round table cover has six equal designs as shown in figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of ₹ 0.35 per cm^2. (use $\sqrt{3}$ = 1.7) **[5]**



32. **Assertion (A):** Area of a sector of a circle of radius r, central angle $\theta = \left(\frac{\theta}{180} \times 2\pi r\right)$ **[1]**

Reason (R): Sector is a part of a circle enclosed between two bounding radii and a corresponding arc.

a) Both A and R are true and R is the correct b) Both A and R are true but R is not the

explanation of A.

correct explanation of A.

c) A is false but R is true.

d) A is true but R is false.

33. **Assertion (A):** Area of a quadrant of a circle of radius 2r is equal to πr^2. **[1]**

Reason (R): Area of a sector is with central angle θ is given by $\frac{\theta}{360} \times \pi r^2$ or $\frac{1}{2} \times l \times r$ where l is length of an arc.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

34. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1cm and the height of the cone is equal to its radius. The volume of the solid is **[1]**

a) $\pi\ cm^3$

b) $4\pi\ cm^3$

c) $2\pi\ cm^3$

d) $3\pi\ cm^3$

35. A circus tent is cylindrical to a height of 4 m and conical above it. If its diameter is 105 m and its slant height is 40 m, the total area of the canvas required in m^2 is **[1]**

a) 1760

b) 7920

c) 2640

d) 3960

36. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ of the volume of the given cone, then the height above the base at which the section has been made, is **[1]**

a) 15 cm

b) 10 cm

c) 25 cm

d) 20 cm

37. A sphere is placed inside a right circular cylinder so as to touch the top, base and lateral surface of the cylinder. If the radius of the sphere is r, then the volume of the cylinder is **[1]**

a) $2\pi r^3$

b) $8\pi r^3$

c) $\frac{8}{3}\pi r^3$

d) $4\pi r^3$

38. The maximum volume of a cone that can be carved out of a solid hemisphere of radius 'r' is **[1]**

a) πr^3

b) $\frac{2}{3}\pi\ r^3$

c) $\frac{1}{3}\pi\ r^3$

d) $\frac{1}{3}\pi\ r^2 h$

39. The radius and height of a right circular cone and that of a right circular cylinder are respectively equal. If the volume of the cylinder is 300 cu.cm, then the volume of the cone is **[1]**

a) 900 cu.cm

b) 600 cu.cm

c) 100 cu.cm

d) 300 cu.cm

40. The curved surface area of a right circular cylinder which just encloses a sphere of radius r is **[1]**

a) $2\pi r^2$

b) $4\pi r^2$

c) $8\pi r^2$

d) $6\pi r^2$

41. Find the ratio of the volume of a cube to the volume of a sphere, if sphere fits completely inside the cube. **[1]**

42. A rectangular container, whose base is a square of side 5 cm stands on a horizontal table and holds water up to 1 **[1]**

cm from the top. When a cube is placed in the water it is completely submerged. The water rises to the top and 2 cubic cm of water overflows. Calculate the volume of the cube and also the length of its edge.

43. A solid toy is in the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm and the height of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the solid toy. (Use π = 22/7) **[1]**

44. Read the following passage and answer the questions given at the end: **[1]**
Students of Class XII presented a gift to their school in the form of an electric lamp in the shape of a glass hemispherical base surmounted by a metallic cylindrical top of same radius 21 cm and height 3.5 cm. The top was silver coated and the glass surface was painted red.

i. What is the cost of silver coating the top at the rate of ₹ 5 per 100 cm^2?

ii. What is the surface area of glass to be painted red?

45. Five identical cubes, each of edge 5 cm, are placed adjacent to each other. Find the volume of the resulting cuboid. **[1]**

46. A sphere of diameter 5 cm is dropped into a cylindrical vessel partly filled with water. The diameter of the base of the vessel is 10 cm. If the sphere is completely submerged, by how much will the level of water rise? **[2]**

47. A vessel in the shape of a cuboid contains some water. If three indentical spheres are immersed in the water, the level of water is increased by 2 cm. If the area of the base of the cuboid is 160 cm^2 and its height 12 cm, determine the radius of any of the spheres. **[2]**

48. A hemisphere of maximum possible diameter is placed over a cuboidal block of side 7 cm. Find the surface area of the solid so formed. **[2]**

49. A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter the diameter of the spherical part is 8.5 cm. By measuring the amount of water it holds, a child finds its volume to be 345 cm^3. Check whether she is correct, taking the above as the inside measurements and π = 3.14. **[2]**

50. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the sphere is 14 cm and the total height of the vessel is 13 cm. Find its capacity. (Take π = 22/7) **[2]**

51. A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The radius and height of the cylindrical part are 5 cm and 13 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Find the surface area of the toy if the total height of the toy is 30 cm. **[2]**

52. The difference between outside and inside surface areas of cylindrical metallic pipe 14 cm long is 44 m^2. If the pipe is made of 99 cm^3 of metal, find the outer and inner radii of the pipe. **[2]**

53. A cubical block of side 7 cm is surrounded by a hemisphere. What is the greatest diameter the hemisphere can have? Find the total surface area of the solid. **[3]**

54. A sphere and a right circular cylinder of the same radius have equal volumes. By what percentage does the diameter of the cylinder exceed its height? **[3]**

55. Sushant has a vessel, of the form of an inverted cone, open at the top, of height 11 cm and radius of top as 2.5 cm and is full of water. Metallic spherical balls each of diameter 0.5 cm are put in the vessel due to which $\left(\frac{2}{5}\right)^{th}$ of the water in the vessel flows out. Find how many balls were put in the vessel. Sushant made the arrangement so that the water that flows out irrigates the flower beds. What value has been shown by Sushant? **[3]**

56. A solid is composed of a cylinder with hemispherical ends. If the length of the whole solid is 108 cm and the diameter of the cylinder is 36 cm, find the cost of polishing the surface at the rate of 7 paise per cm^2. (Use π = **[3]**

3.1416)

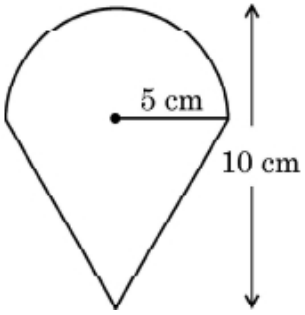
57. A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel. **[3]**

58. From a solid cylinder whose height is 15 cm and diameter 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid. [Use π = 3.14.] **[3]**

59. A solid is in the form of a right circular cylinder, with a hemisphere at one end and a cone at the other end. The radius of the common base is 3.5 cm and the heights of the cylindrical and conical portions are 10 cm. and 6 cm, respectively. Find the total surface area of the solid. (Use π= 22/7) **[3]**

60. A solid is in the shape of a right-circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid. **[5]**

61. An ice-cream filled cone having radius 5 cm and height 10 cm is as shown in the figure. Find the volume of the ice-cream in 7 such cones. **[5]**



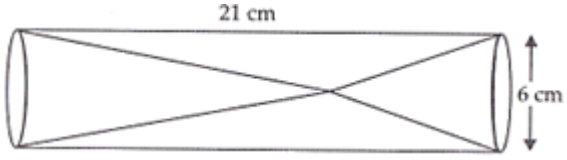
62. A solid is in the form of a right circular cone mounted on a hemisphere. The radius of the hemisphere is 3.5 cm and the height of the cone is 4 cm. The solid is placed in a cylindrical tub, full of water, in such a way that the whole solid is submerged in water. If the radius of the cylinder is 5 cm and its height is 10.5 cm, find the volume of water left in the cylindrical tub. (Use$\pi = \frac{22}{7}$) **[5]**

63. A cylindrical tub of radius 12 cm contains water to a depth of 20 cm. A spherical ball is dropped into the tub and the level of the water is raised by 6.75 cm. Find the radius of the ball. **[5]**

64. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled into it. The diameter of the pencil is 7 mm, the diameter of the graphite is 1 mm and the length of the pencil is 10 cm. Calculate the weight of the whole pencil, if the specific gravity of the wood is 0.7 gm/cm^3 and that of the graphite is 2.1 gm/ cm ^{3}. **[5]**

65. From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is hollowed out. Find the total surface area of the remaining solid. **[5]**

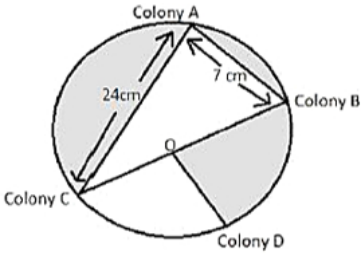
66. Two solid cones A and B placed in a cylindrical tube as shown in the figure. The ratio of their capacities are 2 : 1. Find the heights and capacities of cones. Also, find the volume of the remaining portion of the cylinder. **[5]**



Question No. 67 to 70 are based on the given text. Read the text carefully and answer the questions: **[4]**

To find the polluted region in different areas of Dwarka (a part of Delhi represented by the circle given below) a survey was conducted by the students of class X. It was found that the shaded region is the polluted region, where O is the

centre of the circle.



67. Find the radius of the circle.

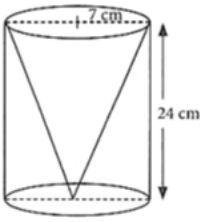
68. Find the area of the circle.

69. If D lies at the middle of arc BC, then what is the area of region COD?

70. Find the area of the polluted region.

Question No. 71 to 74 are based on the given text. Read the text carefully and answer the questions: **[4]**

One day Vinod was going home from school, saw a carpenter working on wood. He found that he is carving out a cone of same height and same diameter from a cylinder. The height of the cylinder is 24 cm and base radius is 7 cm. While watching this, some questions came into Vinod's mind.



71. Find the slant height of the conical cavity so formed?

72. Find the curved surface area of the conical cavity so formed?

73. Find the external curved surface area of the cylinder?

74. Find the ratio of curved surface area of cone to curved surface area of cylinder?